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**Testing US Price Leadership in Major Crop
Markets**

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International grain markets can be viewed as oligopolistic, in which a few dominate sellers can influence the market. An outcome of oligopolistic markets is price leadership by one or a few of the largest suppliers, thereby allowing other smaller suppliers to sell as much as they choose at the price determined by the price-leaders. Several writers have used oligopoly models to describe the international agricultural commodity markets (McCalla; Alaouze et.al; Bredahl and Green; Mitchell and Duncan). In these models, the U.S. was determined to be a price-leader, influencing the world price by its domestic price. Other smaller suppliers face a perfectly elastic export market, wherein they can sell as much as they can export at the leader-selected price. The price leaders, such as the U.S., are 'residual suppliers' – making up the difference in meeting import demand not met by the smaller exports. Smaller exporters use the prices in the largest export nations to set their price slightly lower. Importers view price-leaders as the last-resort highest seller.

Mitchell and Duncan tested whether nations are price leaders by testing the significance of world import demand upon a nation's export quantities. If a nation is a smaller exporter and has no influence on world price, then equation 1 should adequately explain its export volume;

$$\text{Equation 1: } EX_s = f(ES_s, P)$$

Where, export volume (EX) is a function of available volume after meeting domestic demand (ES) and indexed price (P). In this case, the total world import demand does not enter into the small 'price takers' function determining their export volume. It doesn't matter what the level of import demand is, they can export all they can at a given price.

Alternatively, in the case of 'price-leaders', their export volume is dependent upon total world import demand, and should be explained by equation 2.

$$\text{Equation 2: } EX_B = f(ES_B, P, WID)$$

Where, export volume (EX) is a function of available volume and price, as in equation 1, but also world import demand (WID). This should hold true in the case of price-leaders because they are residual suppliers. If world demand increases, they will increase their export volume, but in times of contracting world demand, the price leader's export volume will be diminished first.

After testing this model from 1965 to 1981, Mitchell and Duncan concluded that the U.S. exhibited price leadership in the rice and coarse grain markets. To follow-up their study, we updated the data through 2001 and used that same model to test whether the U.S. is a price leader in the corn, rice and cotton markets, the regressions in table 1 were the results. The significance of total world imports indicates that the U.S. is a

residual supplier in all three commodity markets. If the U.S. is the residual supplier it means that the U.S. price is the ‘last resort’ for importers. Therefore the U.S. price remains as the price leader. In the corn and rice markets, total world imports was highly significant at the 1% level, and at the 10% for cotton.

Table 1. Regression Parameter Values.

<i>Commodity</i>	<i>Intercept</i>	<i>Export availability^a</i>	<i>Export price^b</i>	<i>Total world imports</i>	<i>R²</i>	<i>Durban Watson Stat</i>	<i>Estimation period^c</i>
Corn	-21.360 6.990	0.00137 0.00090	2.718 0.870 ***	0.814 0.085 ***	0.82	1.44	1970-01 OLS
Cotton	-0.698 0.718	0.085 0.029 ***	-0.000606 0.002755	0.195 0.114 *	0.47	1.49	1970-01 OLS
Rice	1026.980 596.910	7.699 4.086 *	0.987 14.669	0.044 0.015 ***	0.61	1.96	1970-01 COR

^a Total Production + Beginning Stock - Domestic Consumption

^b US price / CPI *100

^c The estimation procedure for each equation is indicated by OLS for ordinary least squares and by COR for corrected first order auto-correlation

Citations

Alaouze, CM, AS Watson and NH Sturgess (1987) Oligopoly Pricing in the World Wheat Market, American Journal of Agricultural Economics 60, no. 2 , May.

Bredahl, ME and L Green (1983) Residual Supplies Model of Coarse Grain Trade, American Journal of Agricultural Economics 65, no. 4, November.

McCalla, AF (1966) A Duopoly Model of World Wheat Pricing Journal of Farm Economics, 48, no. 3.

Mitchell, DO and RC Duncan (1987) Market Behavior of Grains Exporters, The World Bank Research Observer 2, no. 1, January.